

ENERGY ENGINEERING ANALYSIS PROGRAM
REDSTONE ARSENAL, ALABAMA
ENERGY SAVINGS OPPORTUNITY SURVEY

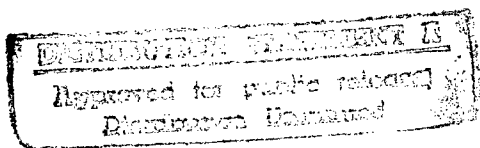
FINAL REPORT

JULY 1987

EXECUTIVE SUMMARY

19971022 136

Prepared for



MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628

By

ENVIRONMENTAL CONTROL SECTION
MOBILE DISTRICT CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628

DTIC QUALITY INSPECTED 8

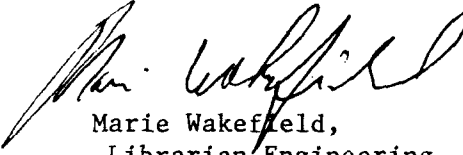


DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO
ATTENTION OF: TR-I Library

17 Sep 1997

Based on SOW, these Energy Studies are unclassified/unlimited.
Distribution A. Approved for public release.


Marie Wakefield,
Librarian Engineering

INDEX OF VOLUMES

EXECUTIVE SUMMARY

VOLUME I - NARRATIVE

EXECUTIVE SUMMARY

SECTION 1 - INTRODUCTION

SECTION 2 - PRESENT CONDITIONS

SECTION 3 - PREVIOUS STUDIES

SECTION 4 - METHODS OF ANALYSIS

SECTION 5 - RESULTS AND RECOMMENDATIONS

APPENDIX A - SCOPE OF WORK

VOLUME II - SUPPORTING DATA

HIGH EFFICIENCY MOTOR ECO'S

STEAM PLANT LOADING ECO'S

VOLUME III - SUPPORTING DATA

INSULATION ECO'S

VOLUME IV - SUPPORTING DATA

REPLACE STEAM TRAP ECO'S

RETURN CONDENSATE ECO'S

VOLUME V - SUPPORTING DATA

REMAINING ECO'S

VOLUME VI - DOCUMENTATION

EXECUTIVE SUMMARY

TABLE OF CONTENTS

SECTION	PAGE
1. INTRODUCTION	ES-1
2. PROJECT APPROACH	ES-2
3. PRESENT ENERGY CONSUMPTION	ES-5
4. CONCLUSIONS AND RECOMMENDATIONS	ES-7
INDEX OF TABLES AND FIGURES	
TABLE ES-1 - ENERGY USAGE AND COSTS FY-85	ES-5
TABLE ES-2 - ECO LIST	ES-20
TABLE ES-3 - RECOMMENDED ECO'S	ES-11
TABLE ES-4 - ENERGY AND COST SAVINGS	ES-8
FIGURE ES-1 - ECO CHECK LIST	ES-4
FIGURE ES-2 - BASEWIDE ENERGY USAGE	ES-6
FIGURE ES-3 - BASEWIDE ENERGY SAVINGS	ES-9
FIGURE ES-4 - 25 YEAR COSTS AND SAVINGS	ES-10

1. INTRODUCTION

This report presents the results of an Energy Savings Opportunity Survey performed under the Energy Engineering Analysis Program (EEAP) at Redstone Arsenal, Alabama. This study included on-site investigation, engineering analysis and produced recommendations for project implementation. All of the Energy Conservation Opportunities (ECO's) listed in the ECO checklist (Figure ES-1, page ES-4) were considered in accordance with the Scope of Work for this study. Other Energy Conservation Opportunities were added to the original ECO checklist as they were discovered.

This report is organized into six separate volumes (general distribution and eight volumes to Redstone Arsenal DEH) and an Executive Summary. Volume I includes the Executive Summary, Narrative (Sections 1 to 5), and Appendix A (Scope of Work).

Section 1 describes the general features of the energy study, the scope of work and the methods of approach used to accomplish the work.

Section 2 provides a general description of the present conditions of the facilities considered in this survey.

Section 3 summarizes prior energy studies for energy conservation opportunities investigated, recommended and documented.

Section 4 describes methods of analysis used to evaluate the energy conservation opportunities.

Section 5 contains the recommendations and conclusions of the energy audit investigation.

Volumes II, III, IV and V contain Appendix B, a description of projects considered for which calculations were performed, along with the calculations, computer outputs, back-up data, etc.

Volume VI contains Appendix C, Programming documents consisting of ECIP project documentation, that is 1391's and PDB-1's, and for Low Cost/No Cost projects DA form 2701, Job Order Request - Facilities Engineering, as requested by Redstone Arsenal.

Volumes VII and VIII, for which copies were sent to Redstone Arsenal DEH only, contain the entire set of calculations for manhole insulation ECO's. This was necessitated by the amount of paper involved. However, Appendix B contains one set of manhole insulation calculations from each boiler plant.

2. PROJECT APPROACH

The field survey was accomplished by a multi-discipline team from the Engineering Division at the Mobile District. Milestones for the facilities energy audit were established and a project schedule was developed. Survey Milestones are as follows:

Mobilization and Development Planning.

Initial Site and Fieldwork at Base Facilities.

Interim Report and Energy Projects Identification.

Follow-up Fieldwork at Base Facilities.

Pre-final Report and Recommended Projects Documentation.

Final Report and Projects Documentation.

Selections for the study team were based on the ECO task distribution given on the checklist provided with the scope of work. The field study team consisted of five senior engineers, a support technician and a team leader. Each team member was provided with available information on assigned tasks prior to the actual site visits. Recommended ECO's provided on the checklist were grouped into two task categories by discipline for investigation and project development. For discipline grouping refer to the ECO checklist shown in Figure ES-1 (page ES-4).

Upon arrival at the site, a meeting was held with the DEH and his utility/energy staff to discuss specific requirements for gathering field data, to coordinate activities and to introduce the study team to the staff. Arrangements were made to obtain building drawings and energy utilization records. Areas of potential energy savings opportunities were discussed in order to plan strategy and procedures. Each ECO was investigated by team members in accordance with the checklist provided. Data was collected by direct investigation, and as allowed in the scope of work from the previous energy study performed by Black and Veatch. Where available construction drawings were obtained for evaluation and analysis of applicable ECO's.

FIGURE ES - 1
ECO CHECK LIST

BUILDING NUMBER	3	4	5	7	7	7	7	8	8	8	5	5	5	4	5	8	7	7	W T P	B W	P S
	6	7	4	1	1	8	0	8	9	4	6	5	5	7	2	2	2	2	A R L	A I	R T
	2	2	1	0	5	2	7	7	7	0	8	0	6	8	8	9	8	9	T E A	S D	E U
	4	5	0	5	3	5	8	4	7	0	1	5	6	6	8	0	0	0	E A N	E E	V D
																			R T T	-	Y
ECO'S																					
REPLACE STANDARD MOTORS W/ HIGH EFF.																				X	
STEAM DISTRIBUTION SYSTEMS																					
ARRANGEMENT/LOAD EVALUATION	X	X	X	X	X	X	X	X	X	X											
ADDITIONAL INSULATION	X	X	X	X	X	X	X	X	X	X											
RETURN CONDENSATE	X	X	X	X	X	X	X	X	X	X											
REPLACE DEFECTIVE TRAPS	X	X	X	X	X	X	X	X	X	X											
HEAT RECOVERY SYSTEMS											X	X									
SELECTIVE ENERGY PLANT																					X
LOW-PRESSURE SODIUM LIGHTING																			X		
COMPUTER ROOM HEAT RECOVERY										X	X										
ELECTRICAL DISTRIBUTION SYSTEM																					X
REPLACE INDUCTION MOTORS >100 HP W/ SYNCHRONOUS																		X			
CHILLER SYSTEM EVALUATION											X										
AUTOMATIC CONDENSER TUBE CLEANING										X	X	X									
EVALUATE BOILER REPLACEMENT															X	X					
ADD SUMMER LOAD CAPACITY			X	X																	
HVAC CONTROLS																					X
TRANSFORMER LOADING																			X		X
TRANSFORMER OVERVOLTAGE																			X		
USE OF HOT WATER HEAT PUMPS																X					
RECLAIM HEAT, FAMILY HOUSING CONDENSERS																					X
REDUCE STREET LIGHTING																				X	
ADD COOLING TOWERS FOR CONDENSING WATER											X										

3. PRESENT ENERGY CONSUMPTION

Basewide energy usage and costs were supplied by Redstone Arsenal DEH for the FY 85. These energy usages and costs are summarized in the Table ES-1 below. These energy usage and costs are demonstrated graphically in the pie charts shown in Figure ES-2 (page ES-6).

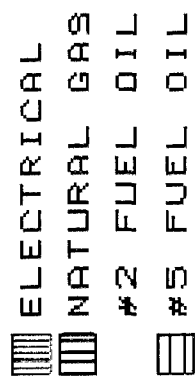
TABLE ES - 1

ENERGY USAGE AND COSTS FY-85

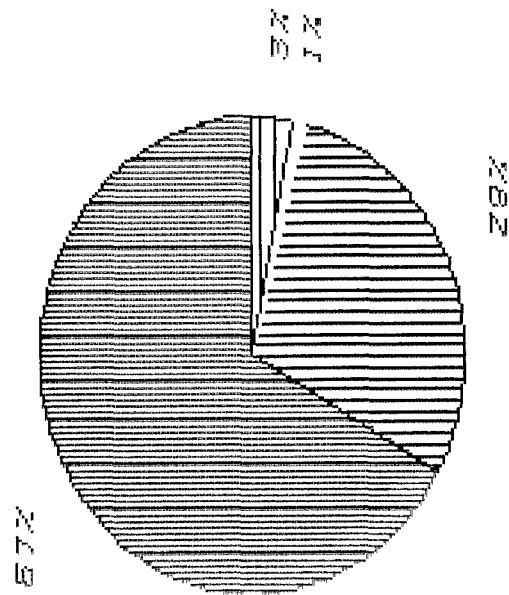
<u>ITEM</u>	<u>MBTU'S</u>	<u>COST</u>
ELECTRICAL	3,361,305	\$12,107,122
NATURAL GAS	1,452,249	\$6,354,687
#2 FUEL OIL	31,288	\$214,303
#5 FUEL OIL	162,072	\$737,440

Note: Electrical MBTU's are "source" MBTU's.

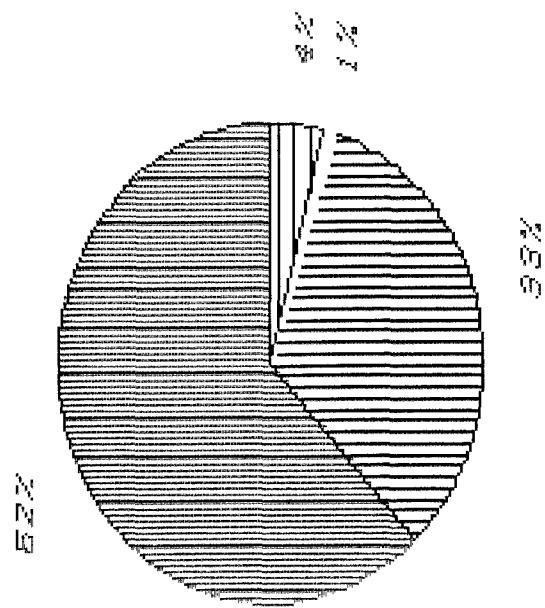
FIGURE ES-2
BASEWIDE ENERGY USAGE
AND COST FY-85



ENERGY USAGE



ENERGY COST



4. CONCLUSIONS AND RECOMMENDATIONS

Table ES-3 (pages ES-20 to ES-31) lists all projects considered. Annual energy savings, annual dollar savings, simple payback in years, SIR and total contract costs are all listed in this table. A brief explanation is given for those projects rejected without engineering evaluation. The projects are ranked according to SIR, from highest to lowest.

Table ES-2 (pages ES-11 to ES-19) is a condensed ECO summary that lists only those projects used to compile the information which determined the total energy savings and represent the projects recommended by this report. This table is comprised of non-overlapping ECO's. The revalidation of the Selective Energy Project was not included in Table ES-2 as it will affect the savings of some ECO's. All information is presented in the same format as Table ES-3. The combined energy savings for all projects listed is 63,695 MBTU's per year. The combined energy and non-energy dollar savings is \$281,472 per year. This is demonstrated graphically in Figure ES-3 (page ES-9). Table ES-4 (page ES-8) lists the MBTU and dollar savings by energy type. Total estimated construction cost of the ECO's in Table ES-2 is \$1,157,446. This results in a simple payback of 4.11 years. A graphical representation of the payback is presented in Figure ES-4 (page ES-10).

TABLE ES - 4
ENERGY SAVINGS

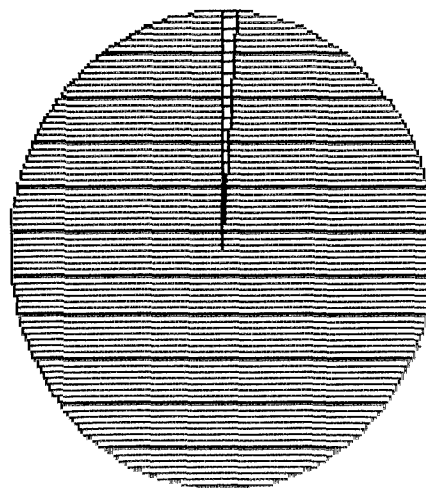
ITEM	MBTU'S	COST
ELECTRICAL	5,494	\$19,778
NATURAL GAS	58,234	\$255,066
#2 FUEL OIL	743	\$5,090
#5 FUEL OIL	(776)	(\$3,532)
TOTALS	63,695	\$276,402

Note: Electrical MBTU's are "source" MBTU's.

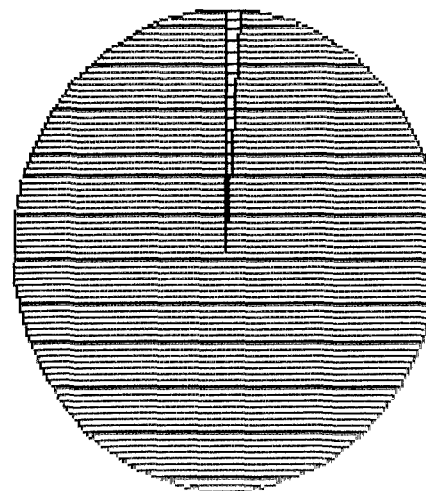
FIGURE ES-3
BASEWIDE ENERGY SAVINGS
AND DOLLAR SAVINGS

NEW USAGE
SAVINGS

ENERGY USAGE



ENERGY COST



BASED ON FY-85

FIGURE ES-4
COMBINED ECO. 25 YEAR
COSTS AND SAVINGS

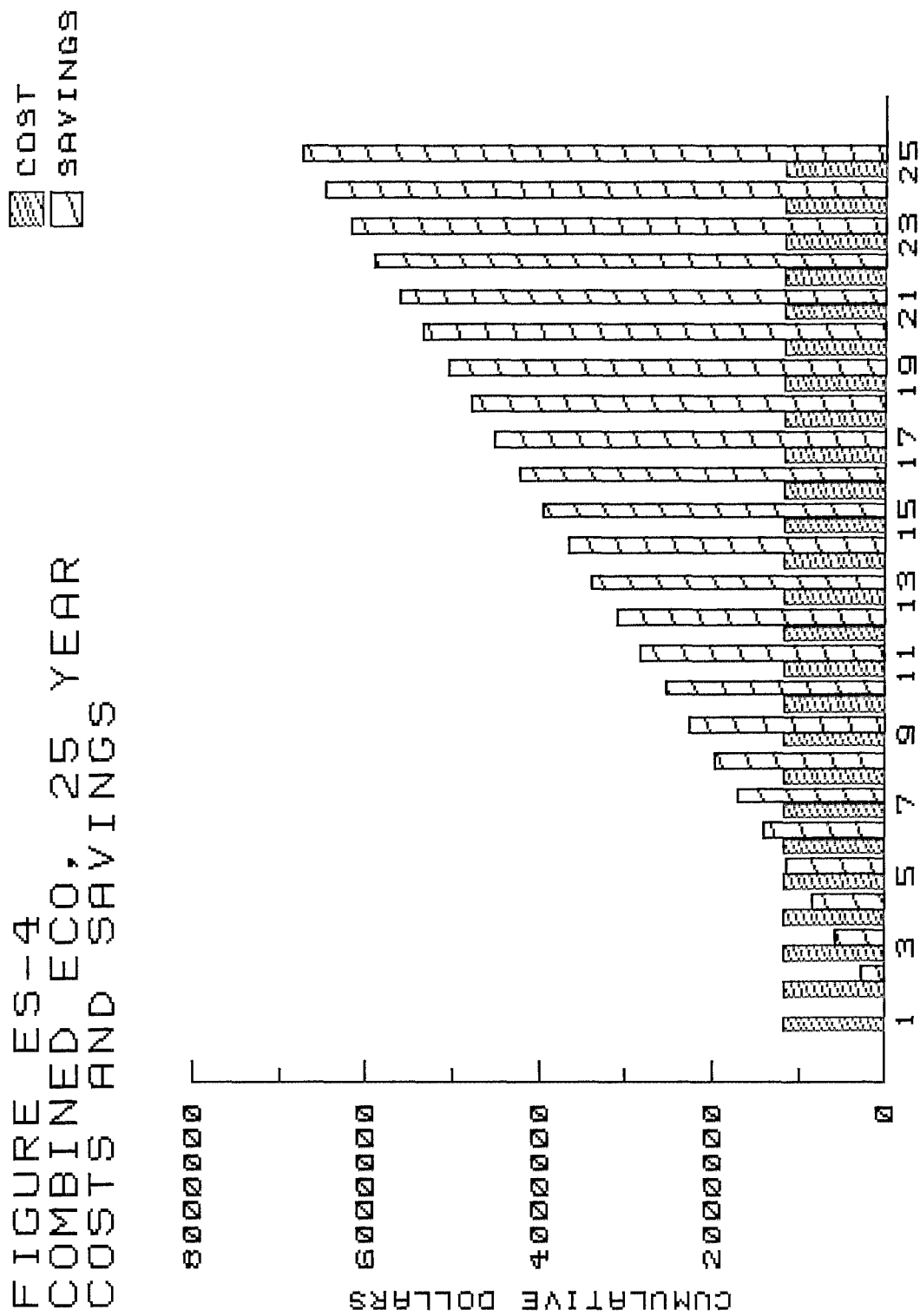


TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
21.03	RETURN CONDENSATE PLANT 3624	MH 20	484.20	1,252	\$ 5,509	\$ 222	0.04	LEAKING CONDENSATE	5-83
12.38	ADD/REPAIR ABOVE GROUND INSULATION	3483	90.53	277	\$ 1,288	\$ 276	0.21	BOILER PLANT 3624	5-49
12.41	ADD/REPAIR ABOVE GROUND INSULATION	3489	88.80	911	\$ 4,239	\$ 925	0.22	BOILER PLANT 3624	5-50
30.06	REPLACE STEAM TRAP PLANT 3624	3559	88.33	487	\$ 2,143	\$ 474	0.22	LEAKING TRAP	5-111
31.17	REPLACE STEAM TRAP PLANT 4725	5681	86.84	241	\$ 1,060	\$ 237	0.22	LEAKING TRAP	5-119
22.05	RETURN CONDENSATE PLANT 4725	4353	80.54	268	\$ 1,181	\$ 285	0.24	CONNECT STEAM TRAP	5-96
13.38	ADD/REPAIR ABOVE GROUND INSULATION	4767	79.43	492	\$ 2,336	\$ 565	0.24	BOILER PLANT 4725	5-71
12.42	ADD/REPAIR ABOVE GROUND INSULATION	3480	73.77	14,402	\$ 66,996	\$ 17,602	0.26	BOILER PLANT 3624	5-51
13.42	ADD/REPAIR ABOVE GROUND INSULATION	4776	73.25	420	\$ 1,995	\$ 523	0.26	BOILER PLANT 4725	5-73
12.47	ADD/REPAIR ABOVE GROUND INSULATION	A	70.74	123	\$ 573	\$ 157	0.27	BOILER PLANT 3624	5-53
13.40	ADD/REPAIR ABOVE GROUND INSULATION	4705	69.50	167	\$ 792	\$ 219	0.28	BOILER PLANT 4725	5-72
12.44	ADD/REPAIR ABOVE GROUND INSULATION	3531	66.68	84	\$ 391	\$ 114	0.29	BOILER PLANT 3624	5-51
22.06	RETURN CONDENSATE PLANT 4725	4373	64.46	361	\$ 1,591	\$ 479	0.30	LEAKING STEAM	5-97
12.40	ADD/REPAIR ABOVE GROUND INSULATION	3474	60.68	33	\$ 155	\$ 50	0.32	BOILER PLANT 3624	5-50
13.47	ADD/REPAIR ABOVE GROUND INSULATION	5436	55.63	70	\$ 331	\$ 114	0.34	BOILER PLANT 4725	5-75
30.01	REPLACE STEAM TRAP PLANT 3624	SEE ECO	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-109
30.02	REPLACE STEAM TRAP PLANT 3624	3553	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-110
30.07	REPLACE STEAM TRAP PLANT 3624	3617	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-111
31.01	REPLACE STEAM TRAP PLANT 4725	4712	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-113
31.02	REPLACE STEAM TRAP PLANT 4725	4776	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-113
31.16	REPLACE STEAM TRAP PLANT 4725	5661	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-119
31.18	REPLACE STEAM TRAP PLANT 4725	5668	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-119

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 11

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.51	ADD REPAIR ABOVE GROUND INSULATION	3775	41.09	37	\$ 164	\$ 78	0.48	BOILER PLANT 3624	5-55
21.08	RETURN CONDENSATE PLANT 3624	3543	38.17	122	\$ 536	\$ 274	0.51	LEAKING STEAM	5-85
21.09	RETURN CONDENSATE PLANT 3624	3614	29.48	244	\$ 1,072	\$ 710	0.66	LEAKING STEAM	5-85
13.48	ADD/REPAIR ABOVE GROUND INSULATION	54747	27.51	156	\$ 686	\$ 484	0.71	BOILER PLANT 4725	5-76
13.52	ADD/REPAIR ABOVE GROUND INSULATION	5614	27.51	16	\$ 69	\$ 48	0.70	BOILER PLANT 4725	5-78
12.48	ADD/REPAIR ABOVE GROUND INSULATION	3489	26.88	180	\$ 791	\$ 575	0.73	BOILER PLANT 3624	5-53
31.03	REPLACE STEAM TRAP PLANT 4725	4373	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-113
31.04	REPLACE STEAM TRAP PLANT 4725	4490	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-114
31.05	REPLACE STEAM TRAP PLANT 4725	MH 6	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-114
31.06	REPLACE STEAM TRAP PLANT 4725	SE MH 6	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-115
31.07	REPLACE STEAM TRAP PLANT 4725	SE MH 7	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-115
31.08	REPLACE STEAM TRAP PLANT 4725	NW MH 8	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-115
31.09	REPLACE STEAM TRAP PLANT 4725	MH 68	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-116
31.10	REPLACE STEAM TRAP PLANT 4725	MH 74	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-116
31.11	REPLACE STEAM TRAP PLANT 4725	MH 64	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-117
31.12	REPLACE STEAM TRAP PLANT 4725	MH 63	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-117
31.13	REPLACE STEAM TRAP PLANT 4725	MH 58	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-117
31.14	REPLACE STEAM TRAP PLANT 4725	MH 54	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-118
31.15	REPLACE STEAM TRAP PLANT 4725	MH 53	26.45	73	\$ 323	\$ 237	0.73	STUCK TRAP	5-118
21.01	RETURN CONDENSATE PLANT 3624	3489	24.67	122	\$ 536	\$ 424	0.79	LEAKING STEAM PIPE	5-82
12.50	ADD/REPAIR ABOVE GROUND INSULATION	3643	23.95	472	\$ 2,076	\$ 1,694	0.82	BOILER PLANT 3624	5-54
13.49	ADD/REPAIR ABOVE GROUND INSULATION	E OF MH3	23.20	97	\$ 428	\$ 358	0.84	BOILER PLANT 4725	5-76

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 12

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.49	ADD/REPAIR ABOVE GROUND INSULATION	3480	22.09	4,032	\$ 17,737	\$ 15,695	0.88	BOILER PLANT 3624	5-54
12.52	INSULATE ABOVE GROUND ACCUMULATORS	3624	22.09	121	\$ 532	\$ 471	0.89	VARIOUS LOCATIONS	5-55
30.03	REPLACE STEAM TRAP PLANT 3624	SEE ECO	22.08	61	\$ 268	\$ 237	0.88	LEAKING TRAP	5-110
30.04	REPLACE STEAM TRAP PLANT 3624	MH 5	22.08	61	\$ 268	\$ 237	0.88	LEAKING TRAP	5-110
30.05	REPLACE STEAM TRAP PLANT 3624	3511	22.08	61	\$ 268	\$ 237	0.88	LEAKING TRAP	5-111
12.46	ADD/REPAIR ABOVE GROUND INSULATION	3559	20.96	27	\$ 117	\$ 109	0.93	BOILER PLANT 3624	5-52
13.33	INSULATE PIPE IN MANHOLE	4725	19.76	13	\$ 55	\$ 54	0.98	MANHOLE 82	5-69
13.36	INSULATE PIPE IN MANHOLE	4725	19.31	14	\$ 61	\$ 61	1.00	MANHOLE 99	5-71
13.37	INSULATE PIPE IN MANHOLE	4725	19.31	14	\$ 61	\$ 61	1.00	MANHOLE 10	5-71
22.23	RETURN CONDENSATE PLANT 4725	5436	19.29	120	\$ 530	\$ 534	1.01	LEAKING STEAM	5-103
21.15	RETURN CONDENSATE PLANT 3624	MH 37	17.68	124	\$ 548	\$ 601	1.10	CONNECT STEAM TRAP	5-87
21.05	RETURN CONDENSATE PLANT 3624	MH 55	17.67	104	\$ 459	\$ 508	1.11	LEAKING CONDENSATE	5-84
21.04	RETURN CONDENSATE PLANT 3624	MH 54	16.93	31	\$ 138	\$ 159	1.15	LEAKING CONDENSATE	5-83
12.31	INSULATE PIPE IN MANHOLE	3624	16.57	12	\$ 55	\$ 65	1.18	MANHOLE 19A	5-46
35.00	REPLACE STEAM TRAP	7855	16.43	45	\$ 196	\$ 237	1.21		5-120
21.07	RETURN CONDENSATE PLANT 3624	3511	16.41	122	\$ 536	\$ 638	1.19	LEAKING STEAM	5-84
13.01	INSULATE PIPE IN MANHOLE	4725	12.08	13	\$ 55	\$ 89	1.62	MANHOLE 75	5-57
13.28	INSULATE PIPE IN MANHOLE	4725	12.03	35	\$ 154	\$ 248	1.61	MANHOLE 97	5-67
13.29	INSULATE PIPE IN MANHOLE	4725	12.03	35	\$ 154	\$ 248	1.61	MANHOLE 98	5-68
12.06	INSULATE PIPE IN MANHOLE	3624	11.68	30	\$ 133	\$ 222	1.67	MANHOLE 13	5-36
12.27	INSULATE PIPE IN MANHOLE	3624	11.48	16	\$ 70	\$ 119	1.70	MANHOLE 3	5-44
13.14	INSULATE PIPE IN MANHOLE	4725	11.43	35	\$ 154	\$ 261	1.69	MANHOLE 47	5-62

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 13

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.24	INSULATE PIPE IN MANHOLE	3624	11.00	43	\$ 188	\$ 334	1.78	MANHOLE 15	5-43
12.15	INSULATE PIPE IN MANHOLE	3624	10.39	8	\$ 36	\$ 68	1.89	MANHOLE 29	5-40
12.26	INSULATE PIPE IN MANHOLE	3624	10.23	16	\$ 70	\$ 84	1.20	MANHOLE 57	5-44
21.14	RETURN CONDENSATE PLANT 3624	HANSON	10.23	21	\$ 92	\$ 175	1.90	LEAKING CONDENSATE	5-87
12.14	INSULATE PIPE IN MANHOLE	3624	10.07	3	\$ 13	\$ 26	2.00	MANHOLE 14	5-39
12.02	INSULATE PIPE IN MANHOLE	3624	9.95	10	\$ 46	\$ 90	1.96	MANHOLE 11	5-34
12.25	INSULATE PIPE IN MANHOLE	3624	9.42	20	\$ 88	\$ 182	2.07	MANHOLE 20	5-43
12.16	INSULATE PIPE IN MANHOLE	3624	9.30	13	\$ 55	\$ 116	2.11	MANHOLE 30	5-40
12.36	INSULATE PIPE IN MANHOLE	3624	9.30	12	\$ 55	\$ 116	2.11	MANHOLE 2	5-48
12.17	INSULATE PIPE IN MANHOLE	3624	9.14	17	\$ 76	\$ 163	2.14	MANHOLE 31	5-40
21.06	RETURN CONDENSATE PLANT 3624	MH 53	9.14	31	\$ 128	\$ 294	2.30	LEAKING CONDENSATE	5-84
12.19	INSULATE PIPE IN MANHOLE	3624	9.09	31	\$ 137	\$ 294	2.15	MANHOLE 19	5-41
12.21	INSULATE PIPE IN MANHOLE	3624	9.06	15	\$ 65	\$ 139	2.14	MANHOLE 17	5-42
12.12	INSULATE PIPE IN MANHOLE	3624	8.98	22	\$ 97	\$ 211	2.18	MANHOLE 26	5-38
13.25	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 94	5-66
13.26	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 95	5-67
13.27	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 96	5-67
12.11	INSULATE PIPE IN MANHOLE	3624	8.91	12	\$ 55	\$ 120	2.18	MANHOLE 25	5-38
13.11	INSULATE PIPE IN MANHOLE	4725	8.91	21	\$ 91	\$ 198	2.18	MANHOLE 54	5-61
12.32	INSULATE PIPE IN MANHOLE	3624	8.88	12	\$ 51	\$ 113	2.22	MANHOLE 18	5-46
13.07	INSULATE PIPE IN MANHOLE	4725	8.83	32	\$ 139	\$ 305	2.19	MANHOLE 63	5-59
13.13	INSULATE PIPE IN MANHOLE	4725	8.80	17	\$ 74	\$ 164	2.22	MANHOLE 52	5-61

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 14

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.22 INSULATE PIPE IN MANHOLE	3624	8.64	23	\$ 102	\$ 231	2.26	MANHOLE 54	5-42
12.05 INSULATE PIPE IN MANHOLE	3624	8.48	23	\$ 100	\$ 231	2.31	MANHOLE 23	5-35
12.07 INSULATE PIPE IN MANHOLE	3624	8.42	18	\$ 77	\$ 179	2.32	MANHOLE 12	5-36
13.19 INSULATE PIPE IN MANHOLE	4725	8.32	32	\$ 141	\$ 329	2.33	MANHOLE 51	5-64
13.15 INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 55	5-62
13.16 INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 56	5-63
13.17 INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 57	5-63
13.20 INSULATE PIPE IN MANHOLE	4725	8.22	37	\$ 163	\$ 384	2.36	MANHOLE 87	5-64
13.12 INSULATE PIPE IN MANHOLE	4725	8.09	31	\$ 137	\$ 328	2.39	MANHOLE 53	5-61
13.18 INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 48	5-63
13.21 INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 90	5-65
13.22 INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 91	5-65
13.23 INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 92	5-65
13.24 INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 93	5-66
10.00 EVALUATE STEAM LOAD	8977	8.05	2,834	\$ 13,422	\$ 33,000	2.46	ADD PART LOAD BOILER	5-31
21.21 RETURN CONDENSATE PLANT 3624	3780-1	8.05	21	\$ 92	\$ 223	2.42	LEAKING CONDENSATE	5-89
12.23 INSULATE PIPE IN MANHOLE	3624	7.98	23	\$ 103	\$ 213	2.07	MANHOLE 55	5-43
12.01 INSULATE PIPE IN MANHOLE	3624	7.96	13	\$ 58	\$ 143	2.47	MANHOLE 9	5-34
13.09 INSULATE PIPE IN MANHOLE	4725	7.96	14	\$ 61	\$ 148	2.43	MANHOLE 59	5-60
13.10 INSULATE PIPE IN MANHOLE	4725	7.96	14	\$ 61	\$ 148	2.43	MANHOLE 60	5-60
22.03 RETURN CONDENSATE PLANT 4725	4471	7.47	21	\$ 91	\$ 236	2.59	LEAKING CONDENSATE	5-96
12.09 INSULATE PIPE IN MANHOLE	3624	7.41	13	\$ 59	\$ 155	2.63	MANHOLE 33	5-37

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 15

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. PAYBACK REMARKS COST YEARS	REF. PAGE
13.35	INSULATE PIPE IN MANHOLE	4725	7.34	29	\$ 128	\$ 340 2.66 MANHOLE 85	5-70
30.08	REPLACE STEAM TRAP PLANT 3624	3648	7.29	40	\$ 177	\$ 474 2.68 LEAKING TRAP	5-112
13.32	INSULATE PIPE IN MANHOLE	4725	7.28	51	\$ 225	\$ 600 2.67 MANHOLE 25	5-69
12.20	INSULATE PIPE IN MANHOLE	3624	7.27	20	\$ 88	\$ 238 2.70 MANHOLE 16	5-42
21.11	RETURN CONDENSATE PLANT 3624	3632	7.20	10	\$ 46	\$ 125 2.72 LEAKING CONDENSATE	5-86
13.02	INSULATE PIPE IN MANHOLE	4725	7.13	55	\$ 242	\$ 659 2.72 MANHOLE 73	5-57
12.08	INSULATE PIPE IN MANHOLE	3624	6.77	12	\$ 53	\$ 153 2.89 MANHOLE 28	5-37
13.08	INSULATE PIPE IN MANHOLE	4725	6.72	59	\$ 259	\$ 747 2.88 MANHOLE 58	5-59
21.24	RETURN CONDENSATE PLANT 3624	3648	6.67	47	\$ 207	\$ 608 2.94 CONNECT STEAM TRAP	5-90
12.10	INSULATE PIPE IN MANHOLE	3624	6.60	30	\$ 131	\$ 408 3.11 MANHOLE 10	5-38
13.06	INSULATE PIPE IN MANHOLE	4725	6.55	42	\$ 187	\$ 555 2.97 MANHOLE 64	5-59
13.05	INSULATE PIPE IN MANHOLE	4725	6.30	34	\$ 151	\$ 466 3.09 MANHOLE 76	5-58
22.21	RETURN CONDENSATE PLANT 4725	VIPER RD	6.18	58	\$ 256	\$ 804 3.14 CONNECT STEAM TRAP	5-102
22.02	RETURN CONDENSATE PLANT 4725	MH 19	6.13	51	\$ 227	\$ 718 3.16 LEAKING CONDENSATE	5-95
22.07	RETURN CONDENSATE PLANT 4725	MH 46	6.09	57	\$ 252	\$ 804 3.19 CONNECT STEAM TRAP	5-97
12.13	INSULATE PIPE IN MANHOLE	3624	6.01	12	\$ 51	\$ 167 3.27 MANHOLE 24	5-39
13.30	INSULATE PIPE IN MANHOLE	4725	5.96	31	\$ 137	\$ 445 3.25 MANHOLE 14	5-68
13.31	INSULATE PIPE IN MANHOLE	4725	5.96	31	\$ 137	\$ 445 3.25 MANHOLE 15	5-69
13.04	INSULATE PIPE IN MANHOLE	4725	5.86	48	\$ 211	\$ 699 3.31 MANHOLE 65	5-58
13.03	INSULATE PIPE IN MANHOLE	4725	5.67	32	\$ 141	\$ 483 3.43 MANHOLE 74	5-57
22.04	RETURN CONDENSATE PLANT 4725	4353	5.67	10	\$ 45	\$ 155 3.44 LEAKING CONDENSATE	5-96
12.34	INSULATE PIPE IN MANHOLE	3624	5.48	10	\$ 45	\$ 161 3.58 MANHOLE 51	5-47

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 16

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
21.13 RETURN CONDENSATE PLANT 3624	CAJUN	5.12	10	\$ 46	\$ 175	3.80	LEAKING CONDENSATE	5-86
13.44 ADD/REPAIR ABOVE GROUND INSULATION	4353	5.00	192	\$ 910	\$ 3,492	3.84	BOILER PLANT 4725	5-74
13.45 ADD/REPAIR ABOVE GROUND INSULATION	5674	4.78	6	\$ 29	\$ 118	4.07	BOILER PLANT 4725	5-75
12.33 INSULATE PIPE IN MANHOLE	3624	4.68	11	\$ 48	\$ 201	4.19	MANHOLE 18A	5-47
13.39 ADD/REPAIR ABOVE GROUND INSULATION	4725	4.56	300	\$ 1,424	\$ 6,004	4.22	BOILER PLANT 4725	5-72
22.18 RETURN CONDENSATE PLANT 4725	5661	4.56	43	\$ 189	\$ 804	4.25	CONNECT STEAM TRAP	5-101
21.12 RETURN CONDENSATE PLANT 3624	3775	4.45	10	\$ 46	\$ 202	4.39	LEAKING CONDENSATE	5-86
22.11 RETURN CONDENSATE PLANT 4725	MH 82	4.43	42	\$ 183	\$ 804	4.39	CONNECT STEAM TRAP	5-98
21.22 RETURN CONDENSATE PLANT 3624	MH 43	4.00	28	\$ 124	\$ 608	4.90	CONNECT STEAM TRAP	5-90
13.34 INSULATE PIPE IN MANHOLE	4725	3.87	26	\$ 114	\$ 573	5.03	MANHOLE 84	5-70
22.15 RETURN CONDENSATE PLANT 4725	5414	3.66	69	\$ 303	\$ 1,609	5.31	CONNECT STEAM TRAP	5-100
22.22 RETURN CONDENSATE PLANT 4725	CALI. DR	3.65	137	\$ 605	\$ 3,217	5.32	CONNECT STEAM TRAP	5-102
13.41 ADD/REPAIR ABOVE GROUND INSULATION	4775	3.63	167	\$ 791	\$ 4,188	5.29	BOILER PLANT 4725	5-73
12.30 INSULATE PIPE IN MANHOLE	3624	3.58	12	\$ 55	\$ 298	5.42	MANHOLE 40	5-45
12.45 ADD/REPAIR ABOVE GROUND INSULATION	MH 5	3.50	7	\$ 30	\$ 168	5.60	BOILER PLANT 3624	5-52
22.20 RETURN CONDENSATE PLANT 4725	5688	3.50	33	\$ 145	\$ 804	5.54	CONNECT STEAM TRAP	5-102
21.10 RETURN CONDENSATE PLANT 3624	3614	3.44	52	\$ 230	\$ 1,305	5.67	LEAKING CONDENSATE	5-85
21.23 RETURN CONDENSATE PLANT 3624	MH 42	3.31	18	\$ 78	\$ 458	5.87	CONNECT STEAM TRAP	5-90
1.40 REP. 40HP MTR. W/HIGH EFF. MTR.	BASEWIDE	3.13	48	\$ 173	\$ 610	3.53	REPLACE ON FAILURE	5-23
12.43 ADD/REPAIR ABOVE GROUND INSULATION	3531	3.09	851	\$ 3,961	\$ 24,879	6.28	BOILER PLANT 3624	5-51
13.46 ADD/REPAIR ABOVE GROUND INSULATION	5435	3.09	109	\$ 516	\$ 3,211	6.22	BOILER PLANT 4725	5-75
21.18 RETURN CONDENSATE PLANT 3624	MH 2	3.05	22	\$ 95	\$ 608	6.40	CONNECT STEAM TRAP	5-88

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 17

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
21.32 RETURN CONDENSATE PLANT 3624	SEE ECO	3.01	636	\$ 2,798	\$ 18,812	6.72	FROM BUILDINGS	5-94
12.39 ADD/REPAIR ABOVE GROUND INSULATION	3479	2.90	35	\$ 163	\$ 1,089	6.68	BOILER PLANT 3624	5-49
26.10 REPAIR CONDENSATE PUMP	7856	2.88	16	\$ 72	\$ 498	6.92	BOILER PLANT 7855	5-108
18.00 ADD INSULATION TO STEAM PIPE	8028	2.85	166	\$ 1,135	\$ 6,648	5.86		5-80
12.53 INSULATE ACCUMULATORS IN MANHOLES	3624	2.83	59	\$ 258	\$ 1,787	6.93	VARIOUS LOCATIONS	5-56
21.02 RETURN CONDENSATE PLANT 3624	MH 36	2.72	10	\$ 46	\$ 330	7.17	LEAKING CONDENSATE	5-83
21.16 RETURN CONDENSATE PLANT 3624	MH 41	2.68	14	\$ 62	\$ 461	7.44	CONNECT STEAM TRAP	5-87
3.00 EVALUATE STEAM LOAD	4725	2.62	11,649	\$ 51,025	\$ 387,903	7.60		5-26
48.00 AUTOMATIC CONDENSER TUBE CLEANING	5400	2.55	3,722	\$ 14,922	\$ 65,113	4.36		5-131
22.13 RETURN CONDENSATE PLANT 4725	MH 84	2.53	24	\$ 105	\$ 804	7.66	CONNECT STEAM TRAP	5-99
21.19 RETURN CONDENSATE PLANT 3624	3635	2.39	104	\$ 459	\$ 3,756	8.18	CONNECT STEAM TRAP	5-89
12.03 INSULATE PIPE IN MANHOLE	3624	2.37	2	\$ 7	\$ 56	8.00	MANHOLE 47	5-35
13.43 ADD/REPAIR ABOVE GROUND INSULATION	MORRIS	2.31	7	\$ 31	\$ 261	8.42	BOILER PLANT 4725	5-74
22.08 RETURN CONDENSATE PLANT 4725	MH 55	2.19	21	\$ 91	\$ 804	8.84	CONNECT STEAM TRAP	5-97
20.00 ADD INSULATION TO STEAM PIPE	8977	2.10	387	\$ 1,840	\$ 16,844	9.15		5-81
21.17 RETURN CONDENSATE PLANT 3624	3658	2.10	7	\$ 30	\$ 275	9.17	CONNECT STEAM TRAP	5-88
21.20 RETURN CONDENSATE PLANT 3624	3782	2.10	7	\$ 30	\$ 275	9.17	CONNECT STEAM TRAP	5-89
22.01 RETURN CONDENSATE PLANT 4725	4776	2.07	19	\$ 86	\$ 804	9.35	CONNECT STEAM TRAP	5-95
1.20 REP. 5HP MTR. W/HIGH EFF. MTR.	BASEWIDE	2.04	8	\$ 29	\$ 156	5.38	REPLACE ON FAILURE	5-23
12.35 INSULATE PIPE IN MANHOLE	3624	2.04	3	\$ 12	\$ 120	10.00	MANHOLE 53	5-48
13.50 ADD/REPAIR ABOVE GROUND INSULATION	5416	1.92	484	\$ 2,133	\$ 21,538	10.10	BOILER PLANT 4725	5-77
11.00 EVALUATE STEAM LOAD	5566	1.90	2,114	\$ 5,130	\$ 110,792	21.60	ADD NEW BOILER PLANT	5-33

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 18

TABLE ES - 2
TOTAL SAVINGS

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. PAYBACK COST YEARS	REMARKS	REF. PAGE
12.04	INSULATE PIPE IN MANHOLE	3624	1.79	1	\$ 6	\$ 69	11.50 MANHOLE 6	5-35
22.09	RETURN CONDENSATE PLANT 4725	MH 56	1.75	16	\$ 72	\$ 804	11.17 CONNECT STEAM TRAP	5-98
22.19	RETURN CONDENSATE PLANT 4725	MH 12	1.75	33	\$ 145	\$ 1,609	11.10 CONNECT STEAM TRAP	5-101
39.00	HEAT RECOVERY	5400	1.74	6,495	\$ 29,002	\$ 233,222	8.04 200 TON HR CHILLER	5-121
49.00	AUTOMATIC CONDENSER TUBE CLEANING	5681	1.68	1,626	\$ 6,374	\$ 42,070	6.60	5-131
22.24	RETURN CONDENSATE PLANT 4725	5403	1.65	6	\$ 27	\$ 323	11.96 CONNECT STEAM TRAP	5-103
12.18	INSULATE PIPE IN MANHOLE	3624	1.62	1	\$ 4	\$ 49	12.25 MANHOLE 36	5-41
12.28	INSULATE PIPE IN MANHOLE	3624	1.61	1	\$ 5	\$ 65	13.00 MANHOLE 41	5-45
12.29	INSULATE PIPE IN MANHOLE	3624	1.61	1	\$ 5	\$ 65	13.00 MANHOLE 39	5-45
21.30	RETURN CONDENSATE PLANT 3624	SEE ECO	1.59	213	\$ 937	\$ 11,974	12.78 FROM BUILDINGS	5-93
5.00	EVALUATE STEAM LOAD	7105	1.57	335	\$ 2,595	\$ 35,557	13.70 ADD PART LOAD BOILER	5-28
22.17	RETURN CONDENSATE PLANT 4725	MH 11	1.51	14	\$ 63	\$ 804	12.76 CONNECT STEAM TRAP	5-101
22.14	RETURN CONDENSATE PLANT 4725	MH 85	1.48	14	\$ 61	\$ 804	13.18 CONNECT STEAM TRAP	5-99
25.00	REPAIR CONDENSATE PUMP	7143	1.43	13	\$ 59	\$ 847	14.36 BOILER PLANT 7153	5-106
22.12	RETURN CONDENSATE PLANT 4725	MH 83	1.42	13	\$ 59	\$ 804	13.63 CONNECT STEAM TRAP	5-99
50.00	AUTOMATIC CONDENSER TUBE CLEANING	4505	1.37	570	\$ 2,232	\$ 17,961	8.05	5-132
52.00	REPLACE BOILER	8786	1.28	105	\$ 669	\$ 9,045	13.52 ASBESTOS REMOVAL REQUIRED	5-132
22.16	RETURN CONDENSATE PLANT 4725	5669	1.18	4	\$ 20	\$ 324	16.20 CONNECT STEAM TRAP	5-100
13.51	ADD/REPAIR ABOVE GROUND INSULATION	5435	1.09	27	\$ 119	\$ 2,121	17.82 BOILER PLANT 4725	5-77
				63,695	\$ 281,472	\$ 1,157,446		

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 19

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
21.03	RETURN CONDENSATE PLANT 3624	MH 20	484.20	1,252	\$ 5,509	\$ 222	0.04	LEAKING CONDENSATE	5-83
12.38	ADD/REPAIR ABOVE GROUND INSULATION	3483	90.53	277	\$ 1,288	\$ 276	0.21	BOILER PLANT 3624	5-49
12.41	ADD/REPAIR ABOVE GROUND INSULATION	3489	88.80	911	\$ 4,239	\$ 925	0.22	BOILER PLANT 3624	5-50
30.06	REPLACE STEAM TRAP PLANT 3624	3559	88.33	487	\$ 2,143	\$ 474	0.22	LEAKING TRAP	5-111
31.17	REPLACE STEAM TRAP PLANT 4725	5681	86.84	241	\$ 1,060	\$ 237	0.22	LEAKING TRAP	5-119
22.05	RETURN CONDENSATE PLANT 4725	4353	80.54	268	\$ 1,181	\$ 285	0.24	CONNECT STEAM TRAP	5-96
13.38	ADD/REPAIR ABOVE GROUND INSULATION	4767	79.43	492	\$ 2,336	\$ 565	0.24	BOILER PLANT 4725	5-71
12.42	ADD/REPAIR ABOVE GROUND INSULATION	3480	73.77	14,402	\$ 66,996	\$ 17,602	0.26	BOILER PLANT 3624	5-51
13.42	ADD/REPAIR ABOVE GROUND INSULATION	4776	73.25	420	\$ 1,995	\$ 523	0.26	BOILER PLANT 4725	5-73
12.47	ADD/REPAIR ABOVE GROUND INSULATION	A	70.74	123	\$ 573	\$ 157	0.27	BOILER PLANT 3624	5-53
13.40	ADD/REPAIR ABOVE GROUND INSULATION	4705	69.50	167	\$ 792	\$ 219	0.28	BOILER PLANT 4725	5-72
12.44	ADD/REPAIR ABOVE GROUND INSULATION	3531	66.68	84	\$ 391	\$ 114	0.29	BOILER PLANT 3624	5-51
22.06	RETURN CONDENSATE PLANT 4725	4373	64.46	361	\$ 1,591	\$ 479	0.30	LEAKING STEAM	5-97
12.40	ADD/REPAIR ABOVE GROUND INSULATION	3474	60.68	33	\$ 155	\$ 50	0.32	BOILER PLANT 3624	5-50
13.47	ADD/REPAIR ABOVE GROUND INSULATION	5436	55.63	70	\$ 31	\$ 114	0.34	BOILER PLANT 4725	5-75
30.01	REPLACE STEAM TRAP PLANT 3624	SEE ECO	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-109
30.02	REPLACE STEAM TRAP PLANT 3624	3553	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-110
30.07	REPLACE STEAM TRAP PLANT 3624	3617	44.17	122	\$ 536	\$ 237	0.44	LEAKING TRAP	5-111
31.01	REPLACE STEAM TRAP PLANT 4725	4712	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-113
31.02	REPLACE STEAM TRAP PLANT 4725	4776	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-113
31.16	REPLACE STEAM TRAP PLANT 4725	5661	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-119
31.18	REPLACE STEAM TRAP PLANT 4725	5668	43.42	120	\$ 530	\$ 237	0.45	LEAKING TRAP	5-119
12.51	ADD REPAIR ABOVE GROUND INSULATION	3775	41.09	37	\$ 164	\$ 78	0.48	BOILER PLANT 3624	5-55
30.00	REPLACE STEAM TRAPS	3624	39.03	1,076	\$ 4,733	\$ 2,370	0.50	ECO'S 30.01 - 30.08	5-109

NOTE: Reference page indicated is in Volume I, Section 5 - Results.

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. PAYBACK COST YEARS	REMARKS	REF. PAGE
21.08	RETURN CONDENSATE PLANT 3624	3543	38.17	122	\$ 536	\$ 274	0.51 LEAKING STEAM	5-85
31.00	REPLACE STEAM TRAPS	4725	33.88	1,670	\$ 7,357	\$ 4,266	0.58 ECO'S 31.01 - 31.18	5-112
21.00	LEAKING CONDENSATE AND STEAM	3624	32.25	2,162	\$ 9,510	\$ 5,764	0.61 LEAKING PIPE ECO'S-3624	5-82
21.09	RETURN CONDENSATE PLANT 3624	3614	29.48	244	\$ 1,072	\$ 710	0.66 LEAKING STEAM	5-85
12.37	ADD/REPAIR ABOVE GROUND INSULATION	3624	28.34	21,651	\$ 95,236	\$ 65,669	0.69 ECO'S 12.38 - 12.53	5-48
13.48	ADD/REPAIR ABOVE GROUND INSULATION	SH747	27.51	156	\$ 686	\$ 484	0.71 BOILER PLANT 4725	5-76
13.52	ADD/REPAIR ABOVE GROUND INSULATION	5614	27.51	16	\$ 69	\$ 48	0.70 BOILER PLANT 4725	5-78
12.48	ADD/REPAIR ABOVE GROUND INSULATION	3489	26.88	180	\$ 791	\$ 575	0.73 BOILER PLANT 3624	5-53
31.03	REPLACE STEAM TRAP PLANT 4725	4373	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-113
31.04	REPLACE STEAM TRAP PLANT 4725	4490	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-114
31.05	REPLACE STEAM TRAP PLANT 4725	MH 6	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-114
31.06	REPLACE STEAM TRAP PLANT 4725	SE MH 6	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-115
31.07	REPLACE STEAM TRAP PLANT 4725	SE MH 7	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-115
31.08	REPLACE STEAM TRAP PLANT 4725	NW MH 8	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-115
31.09	REPLACE STEAM TRAP PLANT 4725	MH 68	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-116
31.10	REPLACE STEAM TRAP PLANT 4725	MH 74	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-116
31.11	REPLACE STEAM TRAP PLANT 4725	MH 64	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-117
31.12	REPLACE STEAM TRAP PLANT 4725	MH 63	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-117
31.13	REPLACE STEAM TRAP PLANT 4725	MH 58	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-117
31.14	REPLACE STEAM TRAP PLANT 4725	MH 54	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-118
31.15	REPLACE STEAM TRAP PLANT 4725	MH 53	26.45	73	\$ 323	\$ 237	0.73 STUCK TRAP	5-118
21.01	RETURN CONDENSATE PLANT 3624	3489	24.67	122	\$ 536	\$ 424	0.79 LEAKING STEAM PIPE	5-82
12.50	ADD/REPAIR ABOVE GROUND INSULATION	3643	23.95	472	\$ 2,076	\$ 1,694	0.82 BOILER PLANT 3624	5-54
13.49	ADD/REPAIR ABOVE GROUND INSULATION	E OF MH3	23.20	97	\$ 428	\$ 358	0.84 BOILER PLANT 4725	5-76

NOTE: Reference page indicated is in Volume I, Section 5 - Results.

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST YEARS	PAYBACK REMARKS	REF. PAGE
22.25	LEAKING CONDENSATE AND STEAM	4725	22.70	563	\$ 2,480	\$ 2,122	0.86 LEAKING PIPE ECO'S-4725	5-103
12.49	ADD/REPAIR ABOVE GROUND INSULATION	3480	22.09	4,032	\$ 17,737	\$ 15,695	0.88 BOILER PLANT 3624	5-54
12.52	INSULATE ABOVE GROUND ACCUMULATORS	3624	22.09	121	\$ 532	\$ 471	0.89 VARIOUS LOCATIONS	5-55
30.03	REPLACE STEAM TRAP PLANT 3624	SEE ECO	22.08	61	\$ 268	\$ 237	0.88 LEAKING TRAP	5-110
30.04	REPLACE STEAM TRAP PLANT 3624	MH 5	22.08	61	\$ 268	\$ 237	0.88 LEAKING TRAP	5-110
30.05	REPLACE STEAM TRAP PLANT 3624	3511	22.08	61	\$ 268	\$ 237	0.88 LEAKING TRAP	5-111
12.46	ADD/REPAIR ABOVE GROUND INSULATION	3559	20.96	27	\$ 117	\$ 109	0.93 BOILER PLANT 3624	5-52
13.33	INSULATE PIPE IN MANHOLE	4725	19.76	13	\$ 55	\$ 54	0.98 MANHOLE 82	5-69
13.36	INSULATE PIPE IN MANHOLE	4725	19.31	14	\$ 61	\$ 61	1.00 MANHOLE 99	5-71
13.37	INSULATE PIPE IN MANHOLE	4725	19.31	14	\$ 61	\$ 61	1.00 MANHOLE 10	5-71
22.23	RETURN CONDENSATE PLANT 4725	5436	19.29	120	\$ 530	\$ 534	1.01 LEAKING STEAM	5-103
21.15	RETURN CONDENSATE PLANT 3624	MH 37	17.68	124	\$ 548	\$ 601	1.10 CONNECT STEAM TRAP	5-87
21.05	RETURN CONDENSATE PLANT 3624	MH 55	17.67	104	\$ 459	\$ 508	1.11 LEAKING CONDENSATE	5-84
21.04	RETURN CONDENSATE PLANT 3624	MH 54	16.93	31	\$ 138	\$ 159	1.15 LEAKING CONDENSATE	5-83
12.31	INSULATE PIPE IN MANHOLE	3624	16.57	12	\$ 55	\$ 65	1.18 MANHOLE 19A	5-46
35.00	REPLACE STEAM TRAP	7855	16.43	45	\$ 196	\$ 237	1.21	5-120
21.07	RETURN CONDENSATE PLANT 3624	3511	16.41	122	\$ 536	\$ 638	1.19 LEAKING STEAM	5-84
13.01	INSULATE PIPE IN MANHOLE	4725	12.08	13	\$ 55	\$ 89	1.62 MANHOLE 75	5-57
13.28	INSULATE PIPE IN MANHOLE	4725	12.03	35	\$ 154	\$ 248	1.61 MANHOLE 97	5-67
13.29	INSULATE PIPE IN MANHOLE	4725	12.03	35	\$ 154	\$ 248	1.61 MANHOLE 98	5-68
12.06	INSULATE PIPE IN MANHOLE	3624	11.68	30	\$ 133	\$ 222	1.67 MANHOLE 13	5-36
12.27	INSULATE PIPE IN MANHOLE	3624	11.48	16	\$ 70	\$ 119	1.70 MANHOLE 3	5-44
13.14	INSULATE PIPE IN MANHOLE	4725	11.43	35	\$ 154	\$ 261	1.69 MANHOLE 47	5-62
12.24	INSULATE PIPE IN MANHOLE	3624	11.00	43	\$ 188	\$ 334	1.78 MANHOLE 15	5-43

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 22

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.15	INSULATE PIPE IN MANHOLE	3624	10.39	8	\$ 36	\$ 68	1.89	MANHOLE 29	5-40
12.26	INSULATE PIPE IN MANHOLE	3624	10.23	16	\$ 70	\$ 84	1.20	MANHOLE 57	5-44
21.14	RETURN CONDENSATE PLANT 3624	HANSON	10.23	21	\$ 92	\$ 175	1.90	LEAKING CONDENSATE	5-87
12.14	INSULATE PIPE IN MANHOLE	3624	10.07	3	\$ 13	\$ 26	2.00	MANHOLE 14	5-39
12.02	INSULATE PIPE IN MANHOLE	3624	9.95	10	\$ 46	\$ 90	1.96	MANHOLE 11	5-34
12.25	INSULATE PIPE IN MANHOLE	3624	9.42	20	\$ 88	\$ 182	2.07	MANHOLE 20	5-43
12.16	INSULATE PIPE IN MANHOLE	3624	9.30	13	\$ 55	\$ 116	2.11	MANHOLE 30	5-40
12.36	INSULATE PIPE IN MANHOLE	3624	9.30	12	\$ 55	\$ 116	2.11	MANHOLE 2	5-48
12.17	INSULATE PIPE IN MANHOLE	3624	9.14	17	\$ 76	\$ 163	2.14	MANHOLE 31	5-40
21.06	RETURN CONDENSATE PLANT 3624	MH 53	9.14	31	\$ 128	\$ 294	2.30	LEAKING CONDENSATE	5-84
12.19	INSULATE PIPE IN MANHOLE	3624	9.09	31	\$ 137	\$ 294	2.15	MANHOLE 19	5-41
12.21	INSULATE PIPE IN MANHOLE	3624	9.06	15	\$ 65	\$ 139	2.14	MANHOLE 17	5-42
12.12	INSULATE PIPE IN MANHOLE	3624	8.98	22	\$ 97	\$ 211	2.18	MANHOLE 26	5-38
13.25	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 94	5-66
13.26	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 95	5-67
13.27	INSULATE PIPE IN MANHOLE	4725	8.92	21	\$ 91	\$ 198	2.18	MANHOLE 96	5-67
12.11	INSULATE PIPE IN MANHOLE	3624	8.91	12	\$ 55	\$ 120	2.18	MANHOLE 25	5-38
13.11	INSULATE PIPE IN MANHOLE	4725	8.91	21	\$ 91	\$ 198	2.18	MANHOLE 54	5-61
12.32	INSULATE PIPE IN MANHOLE	3624	8.88	12	\$ 51	\$ 113	2.22	MANHOLE 18	5-46
13.07	INSULATE PIPE IN MANHOLE	4725	8.83	32	\$ 139	\$ 305	2.19	MANHOLE 63	5-59
13.13	INSULATE PIPE IN MANHOLE	4725	8.80	17	\$ 74	\$ 164	2.22	MANHOLE 52	5-61
12.22	INSULATE PIPE IN MANHOLE	3624	8.64	23	\$ 102	\$ 231	2.26	MANHOLE 54	5-42
12.05	INSULATE PIPE IN MANHOLE	3624	8.48	23	\$ 100	\$ 231	2.31	MANHOLE 23	5-35
12.07	INSULATE PIPE IN MANHOLE	3624	8.42	18	\$ 77	\$ 179	2.32	MANHOLE 12	5-36

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 23

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
13-19	INSULATE PIPE IN MANHOLE	4725	8.32	32	\$ 141	\$ 329	2.33	MANHOLE 51	5-64
13-15	INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 55	5-62
13-16	INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 56	5-63
13-17	INSULATE PIPE IN MANHOLE	4725	8.27	25	\$ 111	\$ 262	2.36	MANHOLE 57	5-63
13-20	INSULATE PIPE IN MANHOLE	4725	8.22	37	\$ 163	\$ 384	2.36	MANHOLE 87	5-64
13-12	INSULATE PIPE IN MANHOLE	4725	8.09	31	\$ 137	\$ 328	2.39	MANHOLE 53	5-61
13-18	INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 48	5-63
13-21	INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 90	5-65
13-22	INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 91	5-65
13-23	INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 92	5-65
13-24	INSULATE PIPE IN MANHOLE	4725	8.06	37	\$ 164	\$ 395	2.41	MANHOLE 93	5-66
10-00	EVALUATE STEAM LOAD	8977	8.05	2,834	\$ 13,422	\$ 33,000	2.46	ADD PART LOAD BOILER	5-31
21-21	RETURN CONDENSATE PLANT 3624	3780-1	8.05	21	\$ 92	\$ 223	2.42	LEAKING CONDENSATE	5-89
12-23	INSULATE PIPE IN MANHOLE	3624	7.98	23	\$ 103	\$ 213	2.07	MANHOLE 55	5-43
12-01	INSULATE PIPE IN MANHOLE	3624	7.96	13	\$ 58	\$ 143	2.47	MANHOLE 9	5-34
13-09	INSULATE PIPE IN MANHOLE	4725	7.96	14	\$ 61	\$ 148	2.43	MANHOLE 59	5-60
13-10	INSULATE PIPE IN MANHOLE	4725	7.96	14	\$ 61	\$ 148	2.43	MANHOLE 60	5-60
13-00	INSULATE PIPE IN STEAM MANHOLES	4725	7.72	1,118	\$ 4,925	\$ 12,393	2.52	ECO'S 13.02 - 13.37	5-56
22-03	RETURN CONDENSATE PLANT 4725	4471	7.47	21	\$ 91	\$ 236	2.59	LEAKING CONDENSATE	5-96
12-09	INSULATE PIPE IN MANHOLE	3624	7.41	13	\$ 59	\$ 155	2.63	MANHOLE 33	5-37
13-35	INSULATE PIPE IN MANHOLE	4725	7.34	29	\$ 128	\$ 340	2.66	MANHOLE 85	5-70
30-08	REPLACE STEAM TRAP PLANT 3624	3648	7.29	40	\$ 177	\$ 474	2.68	LEAKING TRAP	5-112
13-32	INSULATE PIPE IN MANHOLE	4725	7.28	51	\$ 225	\$ 600	2.67	MANHOLE 25	5-69
12-20	INSULATE PIPE IN MANHOLE	3624	7.27	20	\$ 88	\$ 238	2.70	MANHOLE 16	5-42

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 24

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
21-11	RETURN CONDENSATE PLANT 3624	3632	7.20	10	\$ 46	\$ 125	2.72	LEAKING CONDENSATE	5-86
13-02	INSULATE PIPE IN MANHOLE	4725	7.13	55	\$ 242	\$ 659	2.72	MANHOLE 73	5-57
12-00	INSULATE PIPE IN STEAM MANHOLES	3624	7.12	521	\$ 2,292	\$ 5,664	2.47	ECO'S 12.01 - 12.36	5-33
12-08	INSULATE PIPE IN MANHOLE	3624	6.77	12	\$ 53	\$ 153	2.89	MANHOLE 28	5-37
13-08	INSULATE PIPE IN MANHOLE	4725	6.72	59	\$ 259	\$ 747	2.88	MANHOLE 58	5-59
21-24	RETURN CONDENSATE PLANT 3624	3648	6.67	47	\$ 207	\$ 608	2.94	CONNECT STEAM TRAP	5-90
12-10	INSULATE PIPE IN MANHOLE	3624	6.60	30	\$ 131	\$ 408	3.11	MANHOLE 10	5-38
13-06	INSULATE PIPE IN MANHOLE	4725	6.55	42	\$ 187	\$ 555	2.97	MANHOLE 64	5-59
13-05	INSULATE PIPE IN MANHOLE	4725	6.30	34	\$ 151	\$ 466	3.09	MANHOLE 76	5-58
22-21	RETURN CONDENSATE PLANT 4725	VIPER RD	6.18	58	\$ 256	\$ 804	3.14	CONNECT STEAM TRAP	5-102
22-02	RETURN CONDENSATE PLANT 4725	MH 19	6.13	51	\$ 227	\$ 718	3.16	LEAKING CONDENSATE	5-95
22-07	RETURN CONDENSATE PLANT 4725	MH 46	6.09	57	\$ 252	\$ 804	3.19	CONNECT STEAM TRAP	5-97
12-13	INSULATE PIPE IN MANHOLE	3624	6.01	12	\$ 51	\$ 167	3.27	MANHOLE 24	5-39
13-30	INSULATE PIPE IN MANHOLE	4725	5.96	31	\$ 137	\$ 445	3.25	MANHOLE 14	5-68
13-31	INSULATE PIPE IN MANHOLE	4725	5.96	31	\$ 137	\$ 445	3.25	MANHOLE 15	5-69
13-04	INSULATE PIPE IN MANHOLE	4725	5.86	48	\$ 211	\$ 699	3.31	MANHOLE 65	5-58
13-03	INSULATE PIPE IN MANHOLE	4725	5.67	32	\$ 141	\$ 483	3.43	MANHOLE 74	5-57
22-04	RETURN CONDENSATE PLANT 4725	4353	5.67	10	\$ 45	\$ 155	3.44	LEAKING CONDENSATE	5-96
12-34	INSULATE PIPE IN MANHOLE	3624	5.48	10	\$ 45	\$ 161	3.58	MANHOLE 51	5-47
13-53	ADD/REPAIR ABOVE GROUND INSULATION	4725	5.36	2,710	\$ 11,939	\$ 43,244	3.62	ECO'S 13.38 - 13.52	5-78
21-13	RETURN CONDENSATE PLANT 3624	CAJUN	5.12	10	\$ 46	\$ 175	3.80	LEAKING CONDENSATE	5-86
13-44	ADD/REPAIR ABOVE GROUND INSULATION	4353	5.00	192	\$ 910	\$ 3,492	3.84	BOILER PLANT 4725	5-74
13-45	ADD/REPAIR ABOVE GROUND INSULATION	5674	4.78	6	\$ 29	\$ 118	4.07	BOILER PLANT 4725	5-75
12-33	INSULATE PIPE IN MANHOLE	3624	4.68	11	\$ 48	\$ 201	4.19	MANHOLE 18A	5-47

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 25

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
13.39	ADD/REPAIR ABOVE GROUND INSULATION	4725	4.56	300	\$ 1,424	\$ 6,004	4.22	BOILER PLANT 4725	5-72
22.18	RETURN CONDENSATE PLANT 4725	5661	4.56	43	\$ 189	\$ 804	4.25	CONNECT STEAM TRAP	5-101
21.12	RETURN CONDENSATE PLANT 3624	3775	4.45	10	\$ 46	\$ 202	4.39	LEAKING CONDENSATE	5-86
22.11	RETURN CONDENSATE PLANT 4725	MH 82	4.43	42	\$ 183	\$ 804	4.39	CONNECT STEAM TRAP	5-98
22.00	CONNECT STEAM TRAPS	4725	4.22	879	\$ 3,872	\$ 17,819	4.60	CONNECT STEAM TRAPS-4725	5-94
21.25	CONNECT STEAM TRAPS	3624	4.17	371	\$ 1,632	\$ 7,650	4.69	CONNECT STEAM TRAP ECO'S-3624	5-91
21.22	RETURN CONDENSATE PLANT 3624	MH 43	4.00	28	\$ 124	\$ 608	4.90	CONNECT STEAM TRAP	5-90
13.34	INSULATE PIPE IN MANHOLE	4725	3.87	26	\$ 114	\$ 573	5.03	MANHOLE 84	5-70
22.15	RETURN CONDENSATE PLANT 4725	5414	3.66	69	\$ 303	\$ 1,609	5.31	CONNECT STEAM TRAP	5-100
22.22	RETURN CONDENSATE PLANT 4725	CALI. DR	3.65	137	\$ 605	\$ 3,217	5.32	CONNECT STEAM TRAP	5-102
13.41	ADD/REPAIR ABOVE GROUND INSULATION	4775	3.63	167	\$ 791	\$ 4,188	5.29	BOILER PLANT 4725	5-73
12.30	INSULATE PIPE IN MANHOLE	3624	3.58	12	\$ 55	\$ 298	5.42	MANHOLE 40	5-45
12.45	ADD/REPAIR ABOVE GROUND INSULATION	MH 5	3.50	7	\$ 30	\$ 168	5.60	BOILER PLANT 3624	5-52
22.20	RETURN CONDENSATE PLANT 4725	5688	3.50	33	\$ 145	\$ 804	5.54	CONNECT STEAM TRAP	5-102
21.10	RETURN CONDENSATE PLANT 3624	3614	3.44	52	\$ 230	\$ 1,305	5.67	LEAKING CONDENSATE	5-85
21.23	RETURN CONDENSATE PLANT 3624	MH 42	3.31	18	\$ 78	\$ 458	5.87	CONNECT STEAM TRAP	5-90
1.40	REP. 40HP MTR. W/HIGH EFF. MTR.	BASEWIDE	3.13	48	\$ 173	\$ 610	3.53	REPLACE ON FAILURE	5-23
12.43	ADD/REPAIR ABOVE GROUND INSULATION	3531	3.09	851	\$ 3,961	\$ 24,879	6.28	BOILER PLANT 3624	5-51
13.46	ADD/REPAIR ABOVE GROUND INSULATION	5435	3.09	109	\$ 516	\$ 3,211	6.22	BOILER PLANT 4725	5-75
21.18	RETURN CONDENSATE PLANT 3624	MH 2	3.05	22	\$ 95	\$ 608	6.40	CONNECT STEAM TRAP	5-88
21.32	RETURN CONDENSATE PLANT 3624	SEE ECO	3.01	636	\$ 2,798	\$ 18,812	6.72	FROM BUILDINGS	5-94
12.39	ADD/REPAIR ABOVE GROUND INSULATION	3479	2.90	35	\$ 163	\$ 1,089	6.68	BOILER PLANT 3624	5-49
26.10	REPAIR CONDENSATE PUMP	7856	2.88	16	\$ 72	\$ 498	6.92	BOILER PLANT 7855	5-108
18.00	ADD INSULATION TO STEAM PIPE	8028	2.85	166	\$ 1,135	\$ 6,648	5.86		5-80

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 26

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
12.53	INSULATE ACCUMULATORS IN MANHOLES	3624	2.83	59	\$ 258	\$ 1,787	6.93	VARIOUS LOCATIONS	5-56
21.02	RETURN CONDENSATE PLANT 3624	MH 36	2.72	10	\$ 46	\$ 330	7.17	LEAKING CONDENSATE	5-83
21.16	RETURN CONDENSATE PLANT 3624	MH 41	2.68	14	\$ 62	\$ 461	7.44	CONNECT STEAM TRAP	5-87
3.00	EVALUATE STEAM LOAD	4725	2.62	11,649	\$ 51,025	\$ 387,903	7.60		5-26
48.00	AUTOMATIC CONDENSER TUBE CLEANING	5400	2.55	3,722	\$ 14,922	\$ 65,113	4.36		5-131
22.13	RETURN CONDENSATE PLANT 4725	MH 84	2.53	24	\$ 105	\$ 804	7.66	CONNECT STEAM TRAP	5-99
21.19	RETURN CONDENSATE PLANT 3624	3635	2.39	104	\$ 459	\$ 3,756	8.18	CONNECT STEAM TRAP	5-89
12.03	INSULATE PIPE IN MANHOLE	3624	2.37	2	\$ 7	\$ 56	8.00	MANHOLE 47	5-35
13.43	ADD/REPAIR ABOVE GROUND INSULATION	MORRIS	2.31	7	\$ 31	\$ 261	8.42	BOILER PLANT 4725	5-74
22.08	RETURN CONDENSATE PLANT 4725	MH 55	2.19	21	\$ 91	\$ 804	8.84	CONNECT STEAM TRAP	5-97
20.00	ADD INSULATION TO STEAM PIPE	8977	2.10	387	\$ 1,840	\$ 16,844	9.15		5-81
21.17	RETURN CONDENSATE PLANT 3624	3658	2.10	7	\$ 30	\$ 275	9.17	CONNECT STEAM TRAP	5-88
21.20	RETURN CONDENSATE PLANT 3624	3782	2.10	7	\$ 30	\$ 275	9.17	CONNECT STEAM TRAP	5-89
22.01	RETURN CONDENSATE PLANT 4725	4776	2.07	19	\$ 86	\$ 804	9.35	CONNECT STEAM TRAP	5-95
1.20	REP. 5HP MTR. W/HIGH EFF. MTR.	BASEWIDE	2.04	8	\$ 29	\$ 156	5.38	REPLACE ON FAILURE	5-23
12.35	INSULATE PIPE IN MANHOLE	3624	2.04	3	\$ 12	\$ 120	10.00	MANHOLE 53	5-48
13.50	ADD/REPAIR ABOVE GROUND INSULATION	5416	1.92	484	\$ 2,133	\$ 21,538	10.10	BOILER PLANT 4725	5-77
11.00	EVALUATE STEAM LOAD	5566	1.90	2,114	\$ 5,130	\$ 110,792	21.60	ADD NEW BOILER PLANT	5-33
12.04	INSULATE PIPE IN MANHOLE	3624	1.79	1	\$ 6	\$ 69	11.50	MANHOLE 6	5-35
22.09	RETURN CONDENSATE PLANT 4725	MH 56	1.75	16	\$ 72	\$ 804	11.17	CONNECT STEAM TRAP	5-98
22.19	RETURN CONDENSATE PLANT 4725	MH 12	1.75	33	\$ 145	\$ 1,609	11.10	CONNECT STEAM TRAP	5-101
39.00	HEAT RECOVERY	5400	1.74	6,495	\$ 29,002	\$ 233,222	8.04	200 TON HR CHILLER	5-121
10.10	EVALUATE STEAM LOAD	8977	1.71	385	\$ 2,635	\$ 33,000	12.52	SAME AS ECO10 EXCEPT FOR EFF.	5-32
20.10	ADD INSULATION TO STEAM PIPE	8977	1.68	310	\$ 1,472	\$ 16,847	11.44	SAME AS ECO20 EXCEPT BLR. EFF.	5-81

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 27

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
49.00	AUTOMATIC CONDENSER TUBE CLEANING	5681	1.68	1,626	\$ 6,374	\$ 42,070	6.60		5-131
22.24	RETURN CONDENSATE PLANT 4725	5403	1.65	6	\$ 27	\$ 323	11.96	CONNECT STEAM TRAP	5-103
12.18	INSULATE PIPE IN MANHOLE	3624	1.62	1	\$ 4	\$ 49	12.25	MANHOLE 36	5-41
12.28	INSULATE PIPE IN MANHOLE	3624	1.61	1	\$ 5	\$ 65	13.00	MANHOLE 41	5-45
12.29	INSULATE PIPE IN MANHOLE	3624	1.61	1	\$ 5	\$ 65	13.00	MANHOLE 39	5-45
21.30	RETURN CONDENSATE PLANT 3624	SEE ECO	1.59	213	\$ 937	\$ 11,974	12.78	FROM BUILDINGS	5-93
5.00	EVALUATE STEAM LOAD	7105	1.57	335	\$ 2,595	\$ 35,557	13.70	ADD PART LOAD BOILER	5-28
41.10	SELECTIVE ENERGY: PLAN A1	BASEWIDE	1.52	256,385	\$ 2,701,809	\$ 36,033,816	13.34	REVALIDATION	5-122
22.17	RETURN CONDENSATE PLANT 4725	MH 11	1.51	14	\$ 63	\$ 804	12.76	CONNECT STEAM TRAP	5-101
22.14	RETURN CONDENSATE PLANT 4725	MH 85	1.48	14	\$ 61	\$ 804	13.18	CONNECT STEAM TRAP	5-99
25.00	REPAIR CONDENSATE PUMP	7143	1.43	13	\$ 59	\$ 847	14.36	BOILER PLANT 7153	5-106
22.12	RETURN CONDENSATE PLANT 4725	MH 83	1.42	13	\$ 59	\$ 804	13.63	CONNECT STEAM TRAP	5-99
50.00	AUTOMATIC CONDENSER TUBE CLEANING	4505	1.37	570	\$ 2,232	\$ 17,961	8.05		5-132
52.00	REPLACE BOILER	8786	1.28	105	\$ 669	\$ 9,045	13.52	ASBESTOS REMOVAL REQUIRED	5-132
41.50	SELECTIVE ENERGY: PLAN A3	BASEWIDE	1.27	210,534	\$ 3,666,905	\$ 61,698,946	16.83	REVALIDATION	5-122
22.16	RETURN CONDENSATE PLANT 4725	5669	1.18	4	\$ 20	\$ 324	16.20	CONNECT STEAM TRAP	5-100
41.40	SELECTIVE ENERGY: PLAN A2	BASEWIDE	1.14	50,233	\$ 3,822,237	\$ 67,081,291	17.55	REVALIDATION	5-122
41.60	SELECTIVE ENERGY: PLAN A3A	BASEWIDE	1.13	238,190	\$ 4,108,687	\$ 77,561,699	18.88	REVALIDATION	5-122
13.51	ADD/REPAIR ABOVE GROUND INSULATION	5435	1.09	27	\$ 119	\$ 2,121	17.82	BOILER PLANT 4725	5-77
41.70	SELECTIVE ENERGY: PLAN A3B	BASEWIDE	1.07	238,186	\$ 3,653,935	\$ 75,406,435	20.64	REVALIDATION	5-122
41.80	SELECTIVE ENERGY: PLAN A3C	BASEWIDE	1.05	197,346	\$ 4,154,034	\$ 81,134,664	19.53	REVALIDATION	5-122
41.30	SELECTIVE ENERGY: PLAN A1B	BASEWIDE	1.04	284,600	\$ 2,454,240	\$ 51,882,508	21.14	REVALIDATION	5-122
18.10	ADD INSULATION TO CONDENSATE PIPE	8028	0.97	53	\$ 364	\$ 6,254			5-80
41.20	SELECTIVE ENERGY: PLAN A1A	BASEWIDE	0.95	284,894	\$ 2,384,190	\$ 56,947,032		REVALIDATION	5-122

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 28

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. COST	PAYBACK YEARS	REMARKS	REF. PAGE
1.60	REP. 200HP MTR. W/HIGH EFF. MTR.	BASEWIDE	0.90	93	\$ 335	\$ 4,123		REPLACE ON FAILURE	5-23
22.10	RETURN CONDENSATE PLANT 4725	MH 48	0.87	8	\$ 36	\$ 804	16.89	CONNECT STEAM TRAP	5-98
29.00	RETURN CONDENSATE	8973	0.85	80	\$ 381	\$ 8,604		BOILER PLANT 8977	5-108
60.00	RECLAIM HEAT/FAMILY HOUSING	BASEWIDE	0.85	12,800	\$ 50,238	\$ 994,056		REVALIDATION	5-135
22.26	RETURN CONDENSATE PLANT 4725	5671-3	0.77	240	\$ 1,057	\$ 27,596		CONNECT BUILDINGS	5-104
22.27	RETURN CONDENSATE PLANT 4725	5452	0.75	75	\$ 328	\$ 8,759		CONNECT BUILDINGS	5-104
21.31	RETURN CONDENSATE PLANT 3624	SEE ECO	0.73	332	\$ 1,461	\$ 40,408		FROM BUILDINGS	5-93
20.20	ADD INSULATION TO CONDENSATE PIPE	8977	0.68	83	\$ 364	\$ 10,475			5-81
22.29	RETURN CONDENSATE PLANT 4725	4496	0.62	38	\$ 168	\$ 5,478		CONNECT BUILDINGS	5-105
7.00	EVALUATE STEAM LOAD	7855	0.61	434	\$ 1,899	\$ 62,376			5-29
9.00	EVALUATE STEAM LOAD	8874	0.61	108	\$ 739	\$ 20,274			5-31
3.10	EVALUATE STEAM LOAD	4725	0.58	2,580	\$ 11,302	\$ 387,903		ECO 3 EXCEPT HIGHER BLR EFF	5-27
65.00	REINSULATE 24" BELOW GROUND STEAM PIPE	4725	0.55	723	\$ 3,187	\$ 113,252			5-137
22.28	RETURN CONDENSATE PLANT 4725	5674-6	0.54	92	\$ 404	\$ 15,002		CONNECT BUILDINGS	5-105
24.00	RETURN CONDENSATE	SEE ECO	0.53	120	\$ 619	\$ 21,575		BOILER PLANT 7105	5-106
1.30	REP. 40HP MTR. W/HIGH EFF. MTR.	BASEWIDE	0.50	48	\$ 173	\$ 3,794		REPLACE NOW	5-23
43.20	COMPUTER ROOM HEAT RECOVERY	5400	0.50	2,531	\$ 10,414	\$ 239,153		43.1 W/ FREE COOLING	5-128
21.26	RETURN CONDENSATE PLANT 3624	SEE ECO	0.49	1,159	\$ 5,096	\$ 211,105		FROM BUILDINGS	5-91
21.27	RETURN CONDENSATE PLANT 3624	SEE ECO	0.48	165	\$ 724	\$ 30,580		FROM BUILDINGS	5-92
21.28	RETURN CONDENSATE PLANT 3624	SEE ECO	0.47	23	\$ 101	\$ 4,367		FROM BUILDINGS	5-92
1.10	REP. 5HP MTR. W/HIGH EFF. MTR.	BASEWIDE	0.41	8	\$ 29	\$ 771		REPLACE NOW	5-23
43.10	COMPUTER ROOM HEAT RECOVERY	5400	0.38	1,494	\$ 6,680	\$ 229,210			5-127
21.29	RETURN CONDENSATE PLANT 3624	SEE ECO	0.37	20	\$ 88	\$ 4,974		FROM BUILDINGS	5-93
28.00	RETURN CONDENSATE	8878	0.34	43	\$ 308	\$ 15,047		BOILER PLANT 8874	5-108

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 29

TABLE ES - 3
ECO LIST

ECO NUMBER DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. PAYBACK COST YEARS	REMARKS	REF. PAGE
26.00 RETURN CONDENSATE	7853	0.20	10	\$ 45	\$ 4,348	BOILER PLANT 7855	5-107
25.10 RETURN CONDENSATE	7154	0.16	9	\$ 43	\$ 5,400	BOILER PLANT 7153	5-107
1.50 REP. 200HP MTR. W/HIGH EFF. MTR.	BASEWIDE	0.15	93	\$ 335	\$ 24,112	REPLACE NOW	5-23
42.10 LOW PRESSURE SODIUM LIGHTING	BASEWIDE	0.12	1	\$ 3	\$ 222	135W LPS VS 150W HPS	5-126
42.00 LOW PRESSURE SODIUM LIGHTING	BASEWIDE	0.11	1	\$ 2	\$ 182	55W LPS VS 70W HPS	5-126
45.00 ELECTRICAL DISTRIBUTION SYSTEM	BASEWIDE	0.10	4,798	\$ 17,273	\$ 1,954,953		5-129
64.00 ADD COOLING TOWERS	7290	0.07	41	\$ 835	\$ 23,414		5-137
2.00 EVALUATE STEAM LOAD	3624					NO ECO'S FOUND	5-26
4.00 EVALUATE STEAM LOAD	5410					NOT APPLICABLE	5-27
6.00 EVALUATE STEAM LOAD	7153					NO ECO'S FOUND	5-28
8.00 EVALUATE STEAM LOAD	8028					NO ECO'S FOUND	5-29
14.00 ADD INSULATION	5410					NOT APPLICABLE	5-79
15.00 ADD INSULATION	7105					NO ECO'S FOUND	5-79
16.00 ADD INSULATION	7153					NO ECO'S FOUND	5-79
17.00 ADD INSULATION	7855					NO ECO'S FOUND	5-79
19.00 ADD INSULATION	8874					NO ECO'S FOUND	5-80
23.00 RETURN CONDENSATE	5410					NOT APPLICABLE	5-106
27.00 RETURN CONDENSATE	8028					NO ECO'S FOUND	5-108
32.00 REPLACE STEAM TRAP	5410					NOT APPLICABLE	5-120
33.00 REPLACE STEAM TRAP	7105					NO ECO'S FOUND	5-120
34.00 REPLACE STEAM TRAP	7153					NO ECO'S FOUND	5-120
36.00 REPLACE STEAM TRAP	8028					NO ECO'S FOUND	5-121
37.00 REPLACE STEAM TRAPS	8874					NO ECO'S FOUND	5-121
38.00 REPLACE STEAM TRAPS	8977					NO ECO'S FOUND	5-121

NOTE: Reference page indicated is in Volume I, Section 5 - Results.
ES - 30

TABLE ES - 3
ECO LIST

ECO NUMBER	ECO DESCRIPTION	LOCATION	SIR	MBTU/YR. SAVED	\$/YEAR SAVED	CONSTR. PAYBACK COST YEARS	REMARKS	REF. PAGE
40.00	HEAT RECOVERY	5681					NO ECO'S FOUND	5-122
44.00	COMPUTER ROOM HEAT RECOVERY	5681					NOT APPLICABLE	5-129
46.00	SYNC. MOTOR REPLACEMENT	WTR PLMT					NO ECO'S FOUND	5-130
47.00	CHILLER SYSTEM EVALUATION	5400					NO ECO'S FOUND	5-130
51.00	INSTALL SMALL BOILER	5566					SEE ECO NUMBER 11	5-132
53.00	ADD SUMMER LOAD BOILER	4725					SEE ECO 3.00	5-133
54.00	ADD SUMMER LOAD BOILER	5410					NO ECO'S FOUND	5-133
55.00	HVAC CONTROLS	BASEWIDE					ALREADY COMPLETED	5-133
57.00	TRANSFORMER LOADING	BASEWIDE					SAME AS ECO 56	5-134
58.00	TRANSFORMER OVERVOLTAGE	BASEWIDE					NO ECO'S FOUND	5-134
59.00	USE HOT WATER HEAT PUMP	8786					NOT APPLICABLE	5-135
61.00	REDUCE STREET LIGHTING	BASEWIDE					NO ECO'S FOUND	5-136
62.00	ADD COOLING TOWERS	5681					NO ECO'S FOUND	5-136
63.00	ADD COOLING TOWERS	7288					NO ECO'S FOUND	5-137
66.00	CONNECT BOILER PLANTS 7105 & 7153						NO ECO'S FOUND	5-138
56.00	TRANSFORMER LOADING	BASEWIDE	-28	-87	-\$ 330	\$ 10,042		5-133
8.10	CONVERT TO OIL/GAS FIRED	8028	-3.51		-\$ 3,189	\$ 57,938		5-30